What is claimed:

1. A Coriolis flow meter comprising:

flow tube means (102) adapted to receive a material flow;

a driver coil;

meter electronics (321) that applies a drive signal to said driver coil (D) to vibrate said flow tube means with material flow;

said flow tube means vibration with material flow generates Coriolis deflections of said flow tube means; and

pick-off means (LP0, RP0) coupled to said flow tube means for generating pick-off signals representing said Coriolis deflections of said flow tube means; and

means (304, 305, 308, 309) for applying said pick-off signals to said meter electronics for the generation of output signals representing said material flow.

characterized in that:

magnetic material (103) embodies at least a part of said flow tube means;

said driver coil is responsive the said application of said drive signal to generate a magnetic field that interacts with said magnetic material to vibrate said material filled flow tube means.

2. The Coriolis flow meter of claim 1 characterized in that said magnetic material comprises a layer of ferrous material (103, 203) on at least a part of the outer surface of said flow tube means.

3. The Coriolis flow meter of claim 2 characterized in that said magnetic material (103, 203) is extant on less than all of the axial length of said flow tube means.

4. The Coriolis flow meter of claim 2 characterized in that said magnetic material (1101) is extant on the entirety of the axial length of said flow tube means.

5. The Coriolis flow meter of claim 1 characterized in that said magnetic material comprises ferrous material (1101) integral to at least an outer radial portion of said flow tube means;

said ferrous material is devoid of an internal magnetic field.

6. The Coriolis flow meter of claim 5 characterized in that said magnetic material (1002) embodies less than all of the axial length of said flow tube means.

7. The Coriolis flow meter of claim 5 characterized in that said magnetic material (1101) embodies the entirety of the axial length of said flow tube means.

8. The Coriolis flow meter of claim 1 characterized in that said magnetic material (103, 203) comprises hard magnetic material having self-contained magnetic fields.

9. The Coriolis flow meter of claim 8 characterized in that said magnetic material comprises an outer layer extant on less than all of the axial length of said flow tube means.

10. The Coriolis flow meter of claim 8 characterized in that said magnetic material (1301) comprise an outer layer extant on the entirety of the axial length of said flow tube means.

11. The Coriolis flow meter of claim 8 characterized in that said magnetic material (1101) is integral to at least an outer radial portion of said flow tube means.

12. The Coriolis flow meter of claim 8 characterized in that said magnetic material (1002, 1202) embodies less than all of the axial length of said flow tube means.

13. The Coriolis flow meter of claim 11 characterized in that said magnetic material (1101, 1301) embodies the entirety of the axial length of said flow tube means.

14. The Coriolis flow meter of claim 1 characterized in that said flow tube means (102) is straight.

15. The Coriolis flow meter of claim1 characterized in that said flow tube means (202) is of an irregular shape.

16. The Coriolis flow meter of claim1 characterized in that said flow tube means (202) is U-shaped.

17. The Coriolis flowmeter of claim 1 characterized in that said pick-off means comprises a first and a second optical pick-off (700) each comprising a light emitter and a light receiver that converts received light into electrical signals.

18. The Coriolis flow meter of claim 1 characterized in that said driver coil (D) vibrates said flow tube means in a pull-only mode in which said flow tube means material is magnetically attracted to said driver coil when energized with a current flow and in which the inherent elasticity of said flow tube means returns said flow tube means to a rest state upon the cessation of current flow.

19. The Coriolis flow meter of claim 1 characterized in that said driver coil defines a first driver coil (D1);

said Coriolis flow meter further comprising a second driver coil (D2);

said first driver coil and said second driver coil are positioned on opposite sides of said flow tube means ;

said meter electronics applies opposing sinusoidal currents to said first driver coil and to said second driver coil to generate cyclical changing magnetic fields that vibrate said flow tube means cyclically in a push-pull mode between said first driver coil and said second driver coil.

20. The Coriolis flow meter of claim 1 characterized in that mass flow rate of said material flow is less than 10,000 grams/hour.

21. The Coriolis flow meter of claim 1 characterized in that said flow tube means has an internal diameter of less than 2 millimeters.

22. The Coriolis flow meter of claim 1 characterized in that said flow tube means has an internal diameter of less than 2 millimeters and that said mass flow rate of said material flow is less than 10,000 grams per hour.

23. The Coriolis flow meter of claim 1 characterized in that mass flow rate of said material flow is less than 10 grams/hour.

24. The Coriolis flow meter of claim 1 characterized in that said flow tube means has an internal diameter of less than .2 millimeters.

25. The Coriolis flow meter of claim 1 characterized in that said flow tube means has an internal diameter of less than .2 millimeters and that said mass flow rate of said material flow is less than 10 grams per hour.

26. The Coriolis flow meter of claim 1 characterized in that said flow tube means has an internal diameter of less than .9 millimeters.

27. The Coriolis flow meter of claim 1 characterized in that said flow tube means has an internal diameter of less than .9 millimeters and that said mass flow rate is less than 10,000 grams per hour.

28. The Coriolis flow meter of claim1 characterized in that said flow tube means comprises a single flow tube (102, 202).

29. The Coriolis flow meter of claim 1 characterized in that said flow tube means comprises a first flow tube (1402C1) and a second flow tube (1402C2) parallel to said first flow tube;

said driver coil is positioned intermediate said first flow tube and said second flow tube to vibrate said first flow tube and said second flow tube in phase opposition.

30. The Coriolis flow meter of claim 29 characterized in that said first flow tube and said second flow tube are U-shaped with each having a left leg and a right leg connected by a top center element;

said pick-off means comprises first and second optical pick-offs proximate said flow tubes for generating said pick-off signals representing said Coriolis deflections of said flow tubes.

31. The Coriolis flow meter of claim 30 characterized in that said driver coil (D) is positioned proximate the axial mid portion (1403-1, 1403-2) of said top center element.

32. The Coriolis flow meter of claim 29 characterized in that said magnetic material comprises hard magnetic material having internal magnetic fields;

said magnetic material extends along the axial length of said flow tubes so that the magnetic field of said material is applied to said pick-offs (LP0, RP0);

said pick-offs (LP0, RP0) are responsive to the magnetic field of said magnetic material and to said Coriolis deflections of said U-shaped flow tubes to generate said pick-off signals representing said Coriolis deflections.

33. The Coriolis flow meter of claim 29 characterized in that said pick-off means comprises first and second optical pick-offs (700) proximate said flow tubes for generating said output signals representing said Coriolis deflections of said flow tubes.

34. The Coriolis flow meter of claim 1 characterized in that said flow tube is formed of stainless steel.

35. The Coriolis flow meter of claim 1 characterized in that:

said flow tube means is formed of hard magnetic material having internal North/South magnetic fields;

said pick-offs means (LP0, RP0) are magnetic transducers;

said magnetic material axially extends on said flow tube means proximate said driver coil and said magnetic transducers; and

said vibration of said material filled flow tube means induces magnetic fields representing said Coriolis deflections in said magnetic transducers.

36. The Coriolis flow meter of claim 1 characterized in that flow tube means comprises dual straight flow tubes (1511, 1512);

said driver coil (D) is positioned intermediate said flow tubes and is effective to vibrate said dual flow tube in phase opposition.

37. The Coriolis flow meter of claim 1 characterized in that flow tube means comprises dual straight parallel flow tubes;

said Coriolis flow meter further comprises a pair of driver coils (D1, D2) positioned on the outer sides of said flow tubes and being effective to vibrate said dual flow tubes in phase opposition.

38. The Coriolis flow meter of claim 37 characterized in that said pick-offs are optical pick-offs.

39. The Coriolis flow meter of claim 37 characterized in that said pick-offs are magnetic transducers.

40. The Coriolis flow meter of claim 1 characterized in that:

said driver coil (D) is effective to vibrate said flow tube means (1703-1, 1703-2) in phase opposition in a push-pull mode;

said pick-off means comprises magnetic transducers that interact with the magnetic fields of said vibrating flow tube means to generate said pick-off signals.

41. The Coriolis flow meter of claim 1 characterized in that:

said flow tube means comprises a pair of said straight flow tubes (1502-1, 1502-2);

said driver coil (D) is positioned intermediate said flow tubes proximate the axial center portion of said flow tubes to vibrate said flow tubes transversely in phase opposition;

said transducers are positioned intermediate said flow tube on opposite sides of said drive coil.

42. The Coriolis flow meter of claim 39 characterized in that:

said flow tube means comprises a pair of U-shaped flow tubes (1401C1, 1401C2);

said driver coil (D) is positioned intermediate said flow tubes proximate a top axial center portion of said flow tubes;

said transducers (LP0, RP0) are positioned intermediate said flow tubes on opposite sides of said drive coil.